

Benfield et al.

Method and system for restricting and enhancing topology displays
for multi-customer logical networks within a network management system

1/21

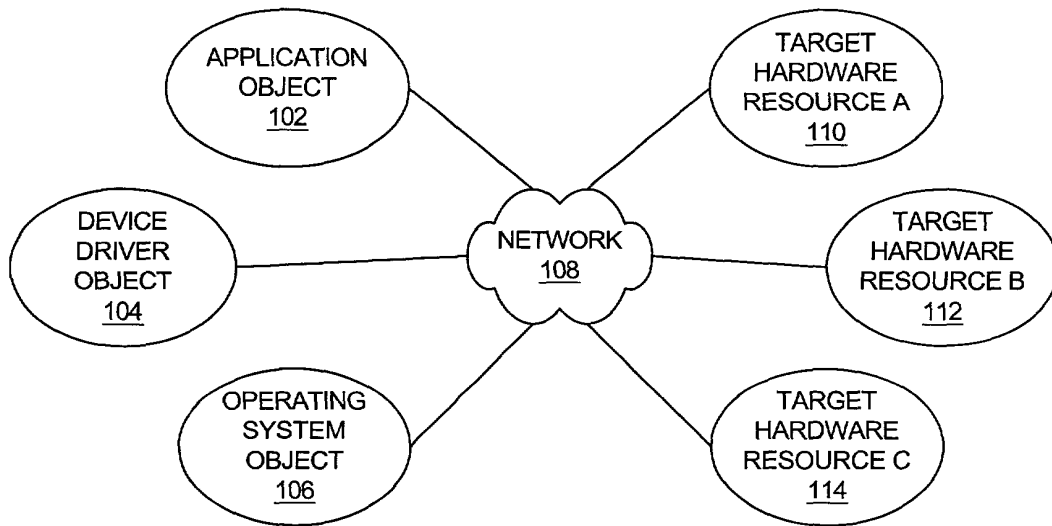


FIG. 1
(PRIOR ART)

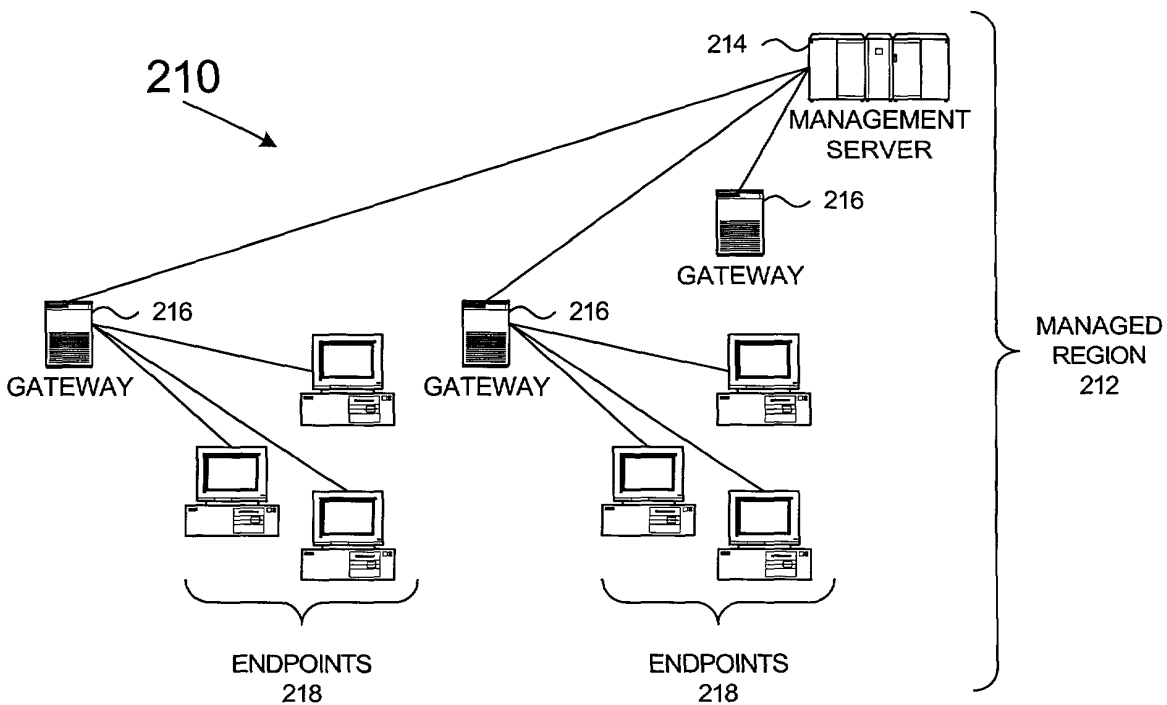


FIG. 2A

Method and system for restricting and enhancing topology displays
for multi-customer logical networks within a network management system

2/21

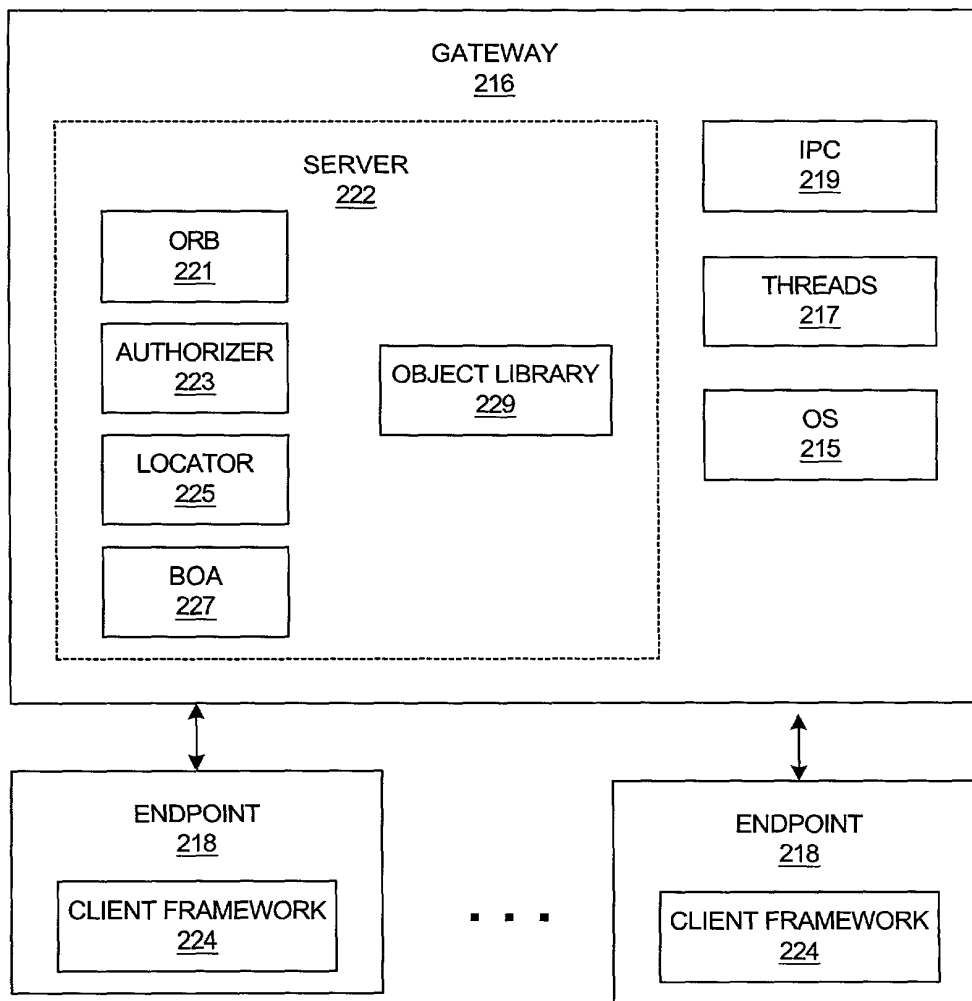


FIG. 2B

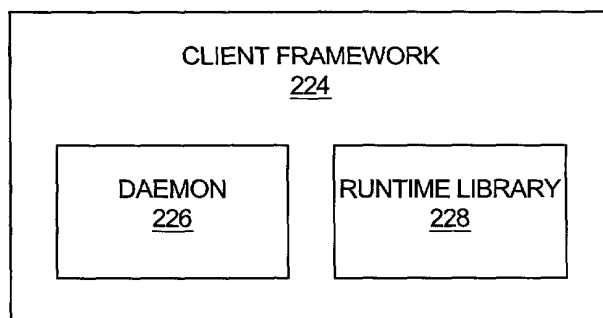


FIG. 2C

Method and system for restricting and enhancing topology displays
for multi-customer logical networks within a network management system

3/21

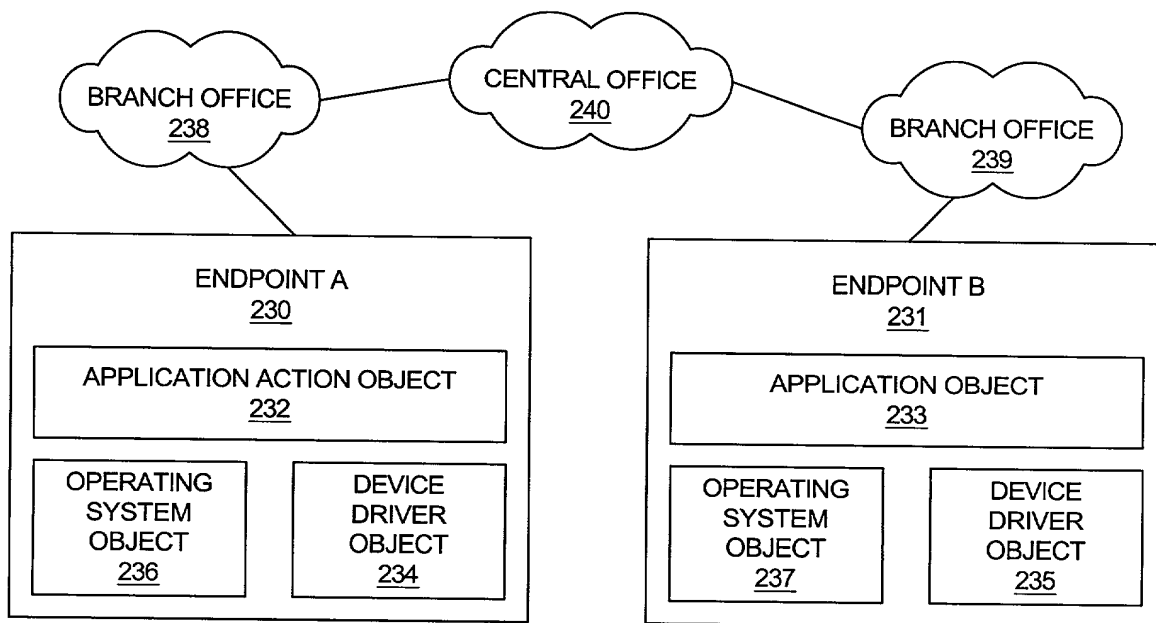


FIG. 2D

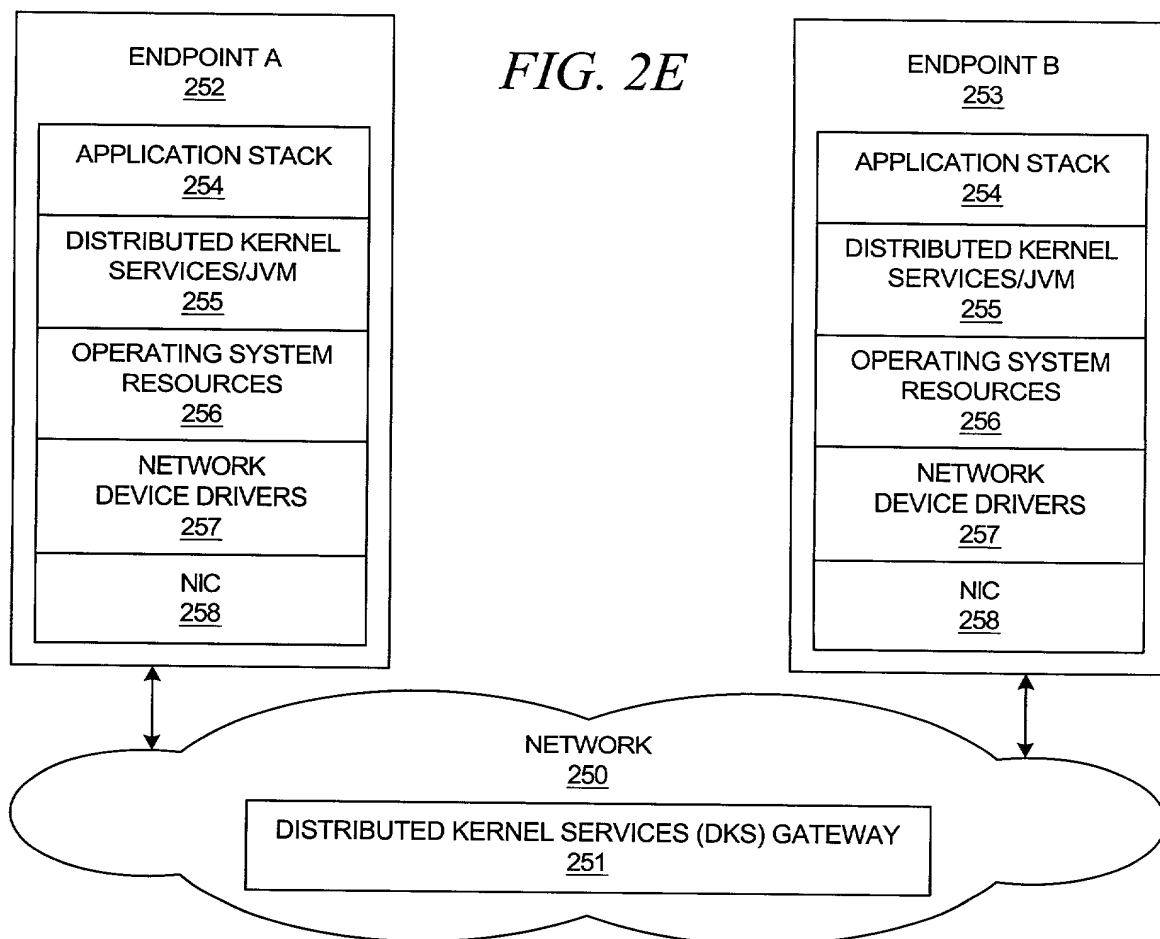


FIG. 2E

4/21

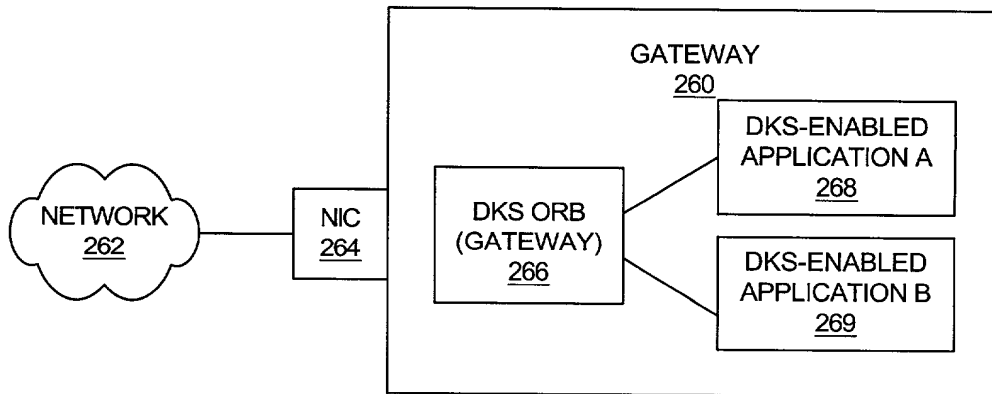


FIG. 2F

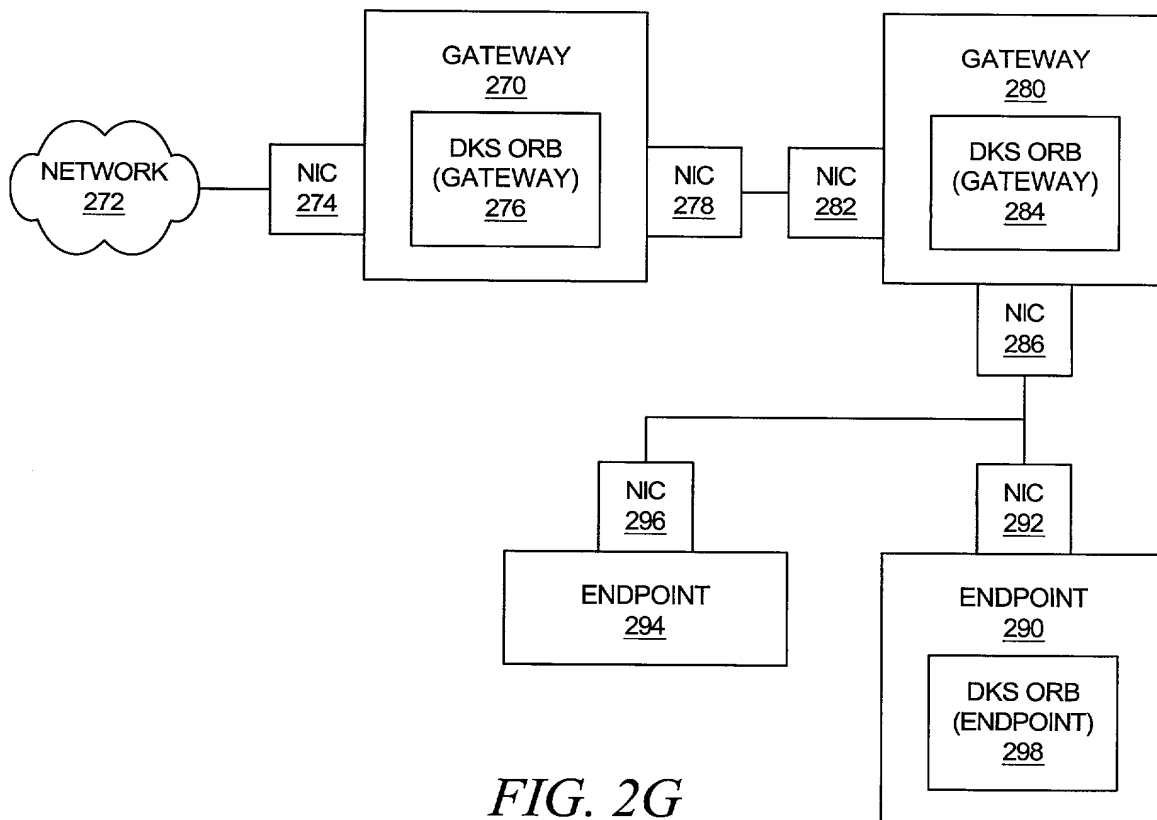


FIG. 2G

Method and system for restricting and enhancing topology displays
for multi-customer logical networks within a network management system

5/21

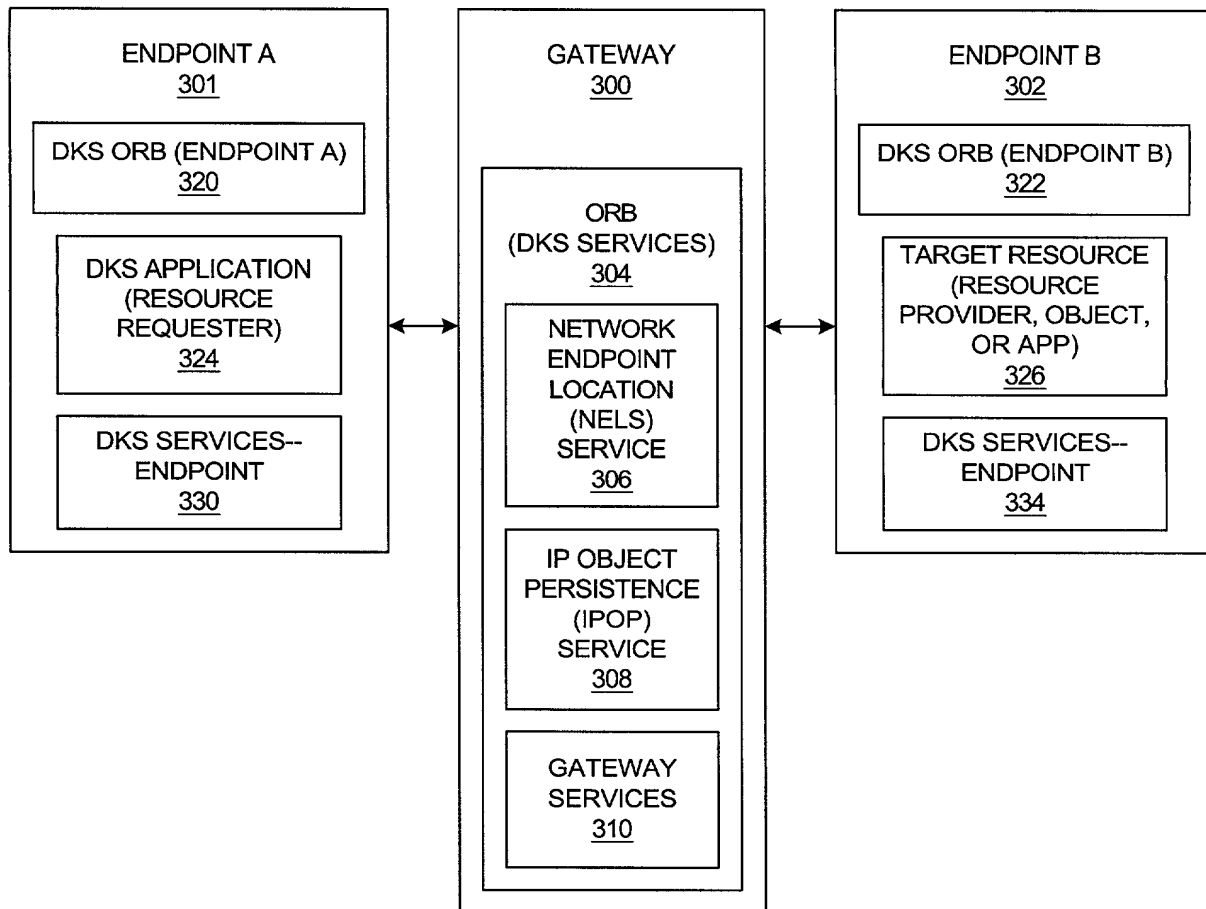


FIG. 3

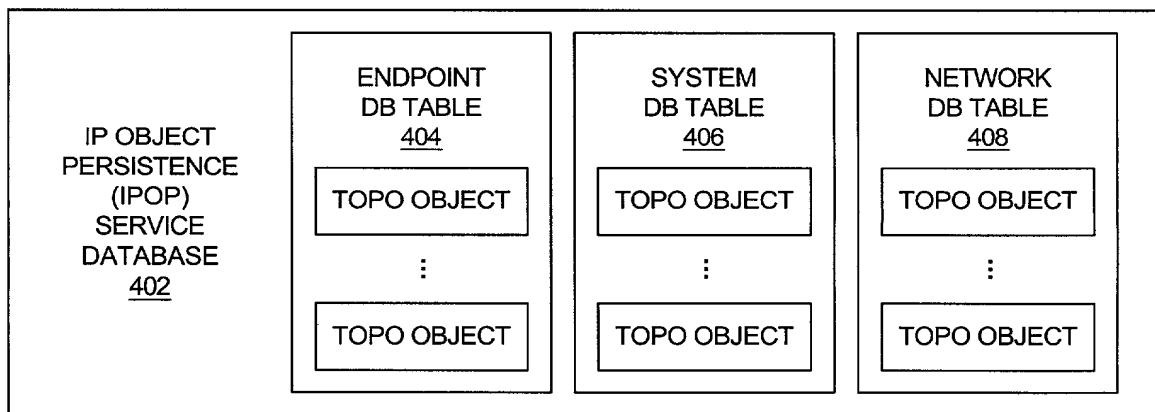


FIG. 4

Method and system for restricting and enhancing topology displays
for multi-customer logical networks within a network management system

6/21

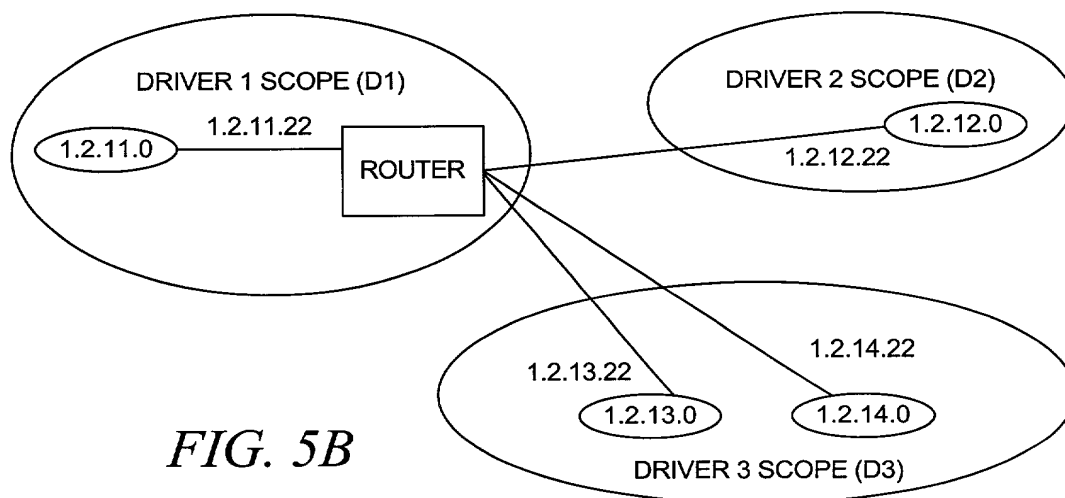
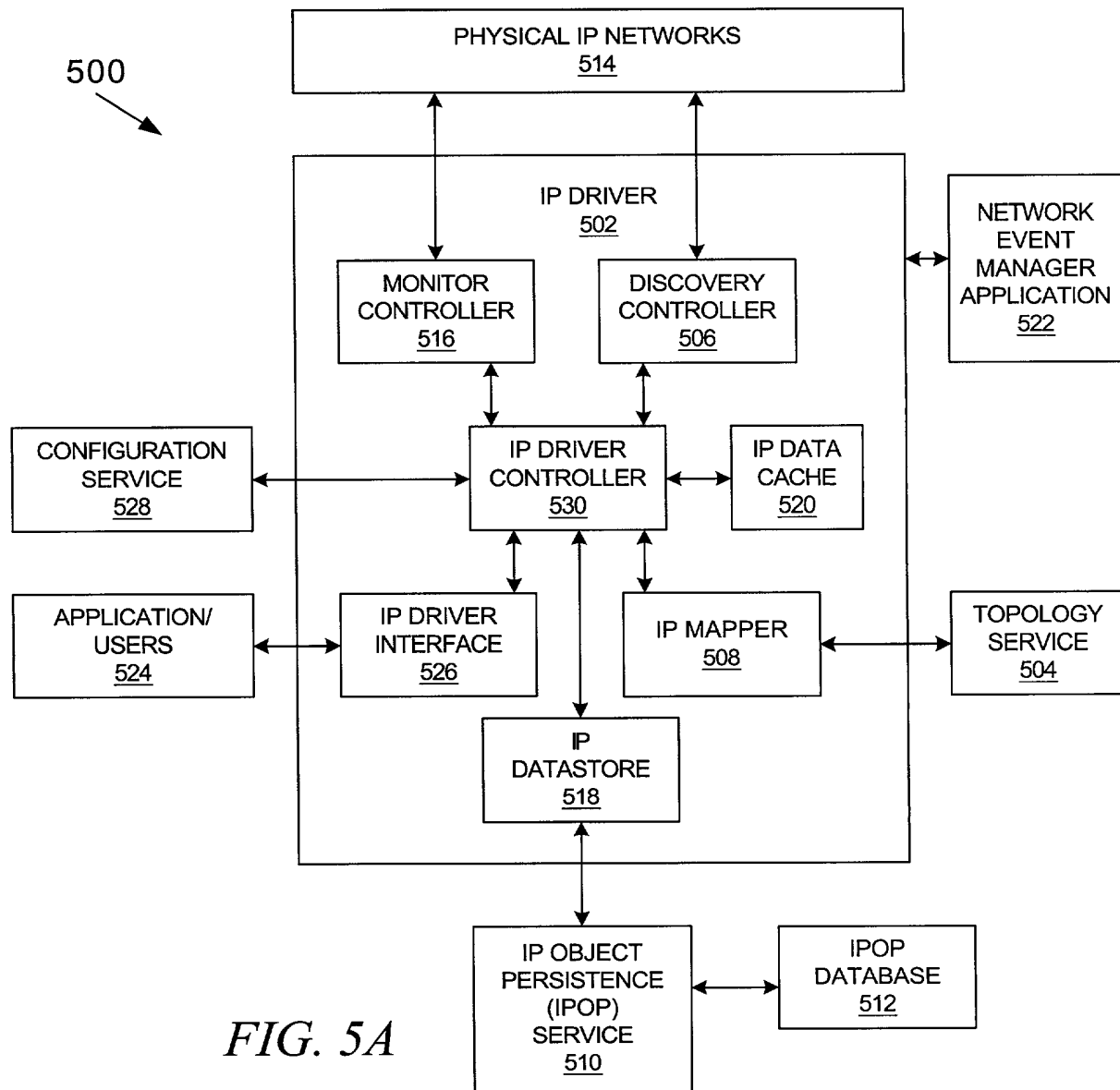


FIG. 5B

7/21

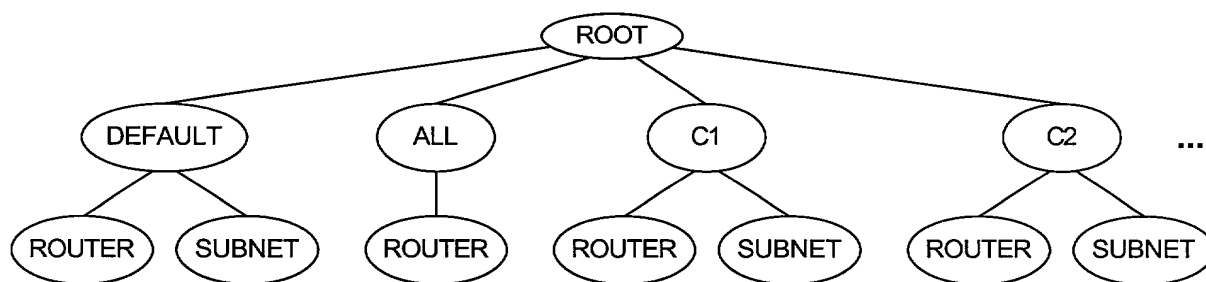


FIG. 5C

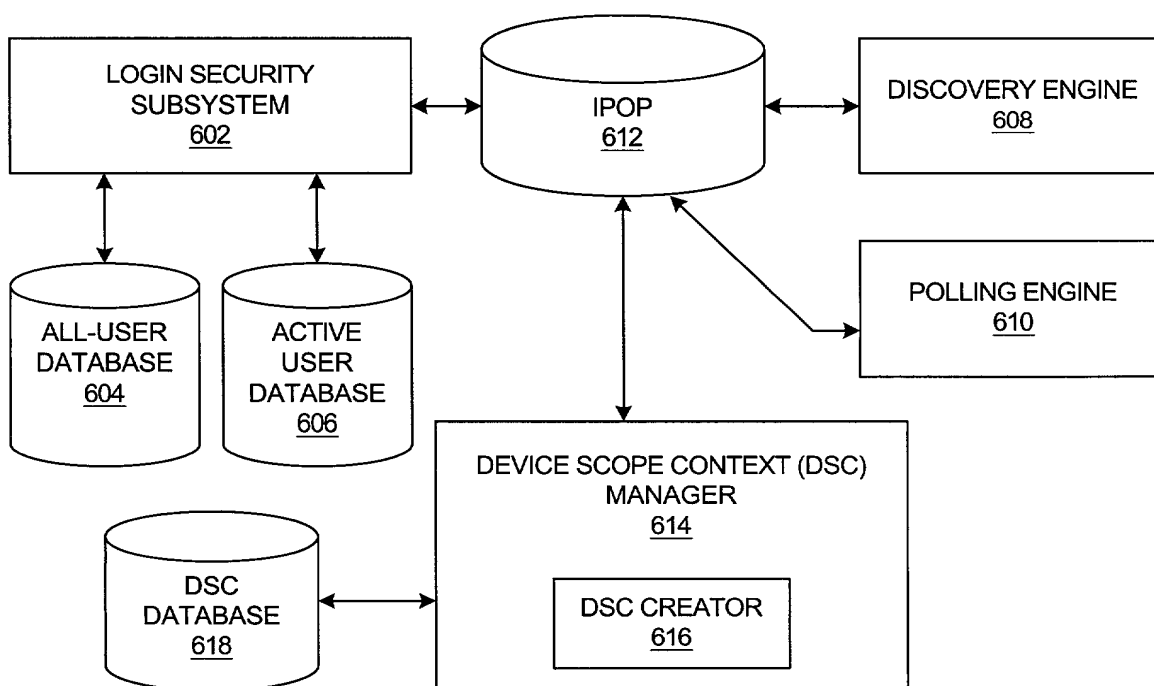
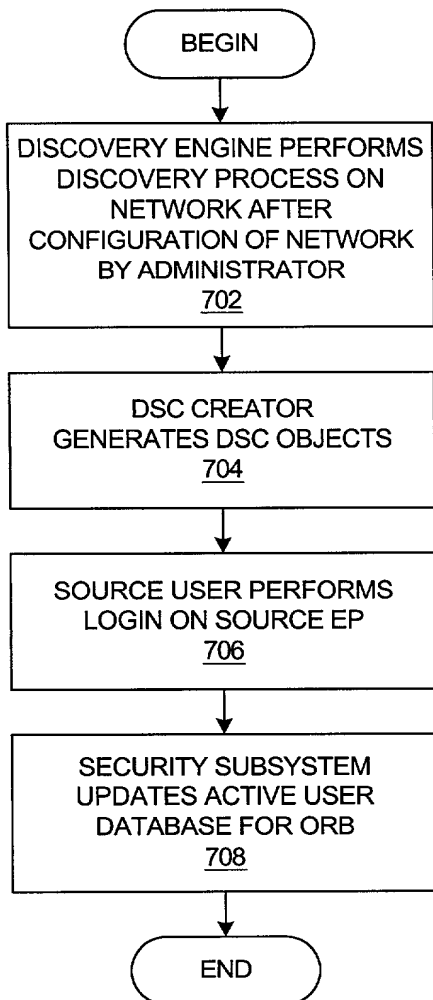
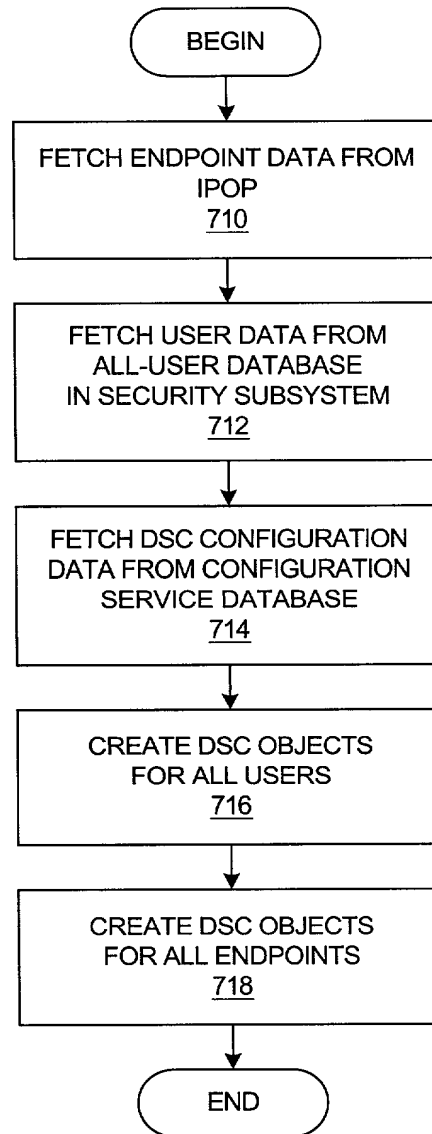


FIG. 6

Method and system for restricting and enhancing topology displays
for multi-customer logical networks within a network management system

8/21

*FIG. 7A**FIG. 7B*

Method and system for restricting and enhancing topology displays
for multi-customer logical networks within a network management system

9/21

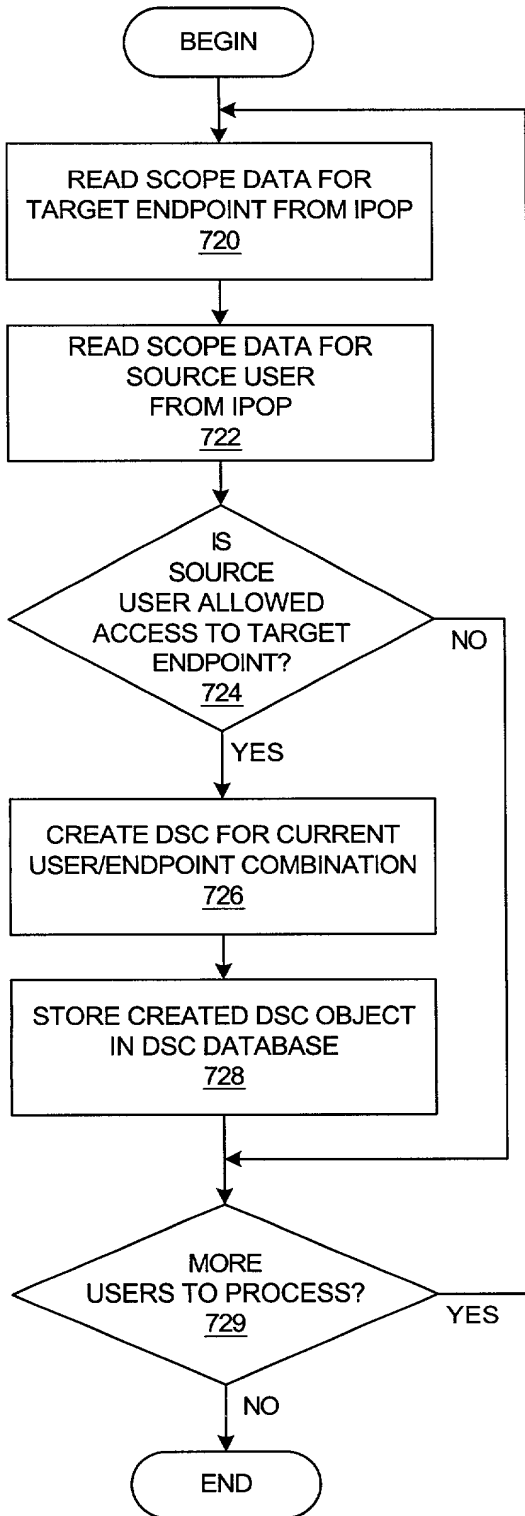


FIG. 7C

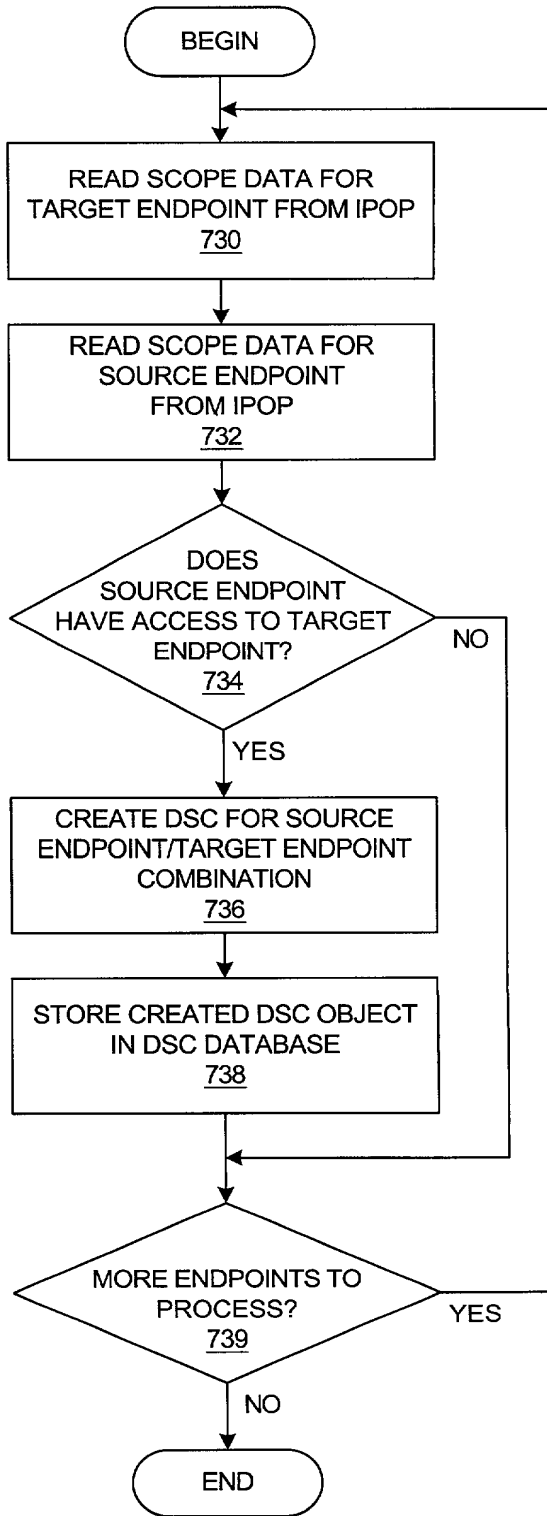


FIG. 7D

**Method and system for restricting and enhancing topology displays
for multi-customer logical networks within a network management system**

10/21

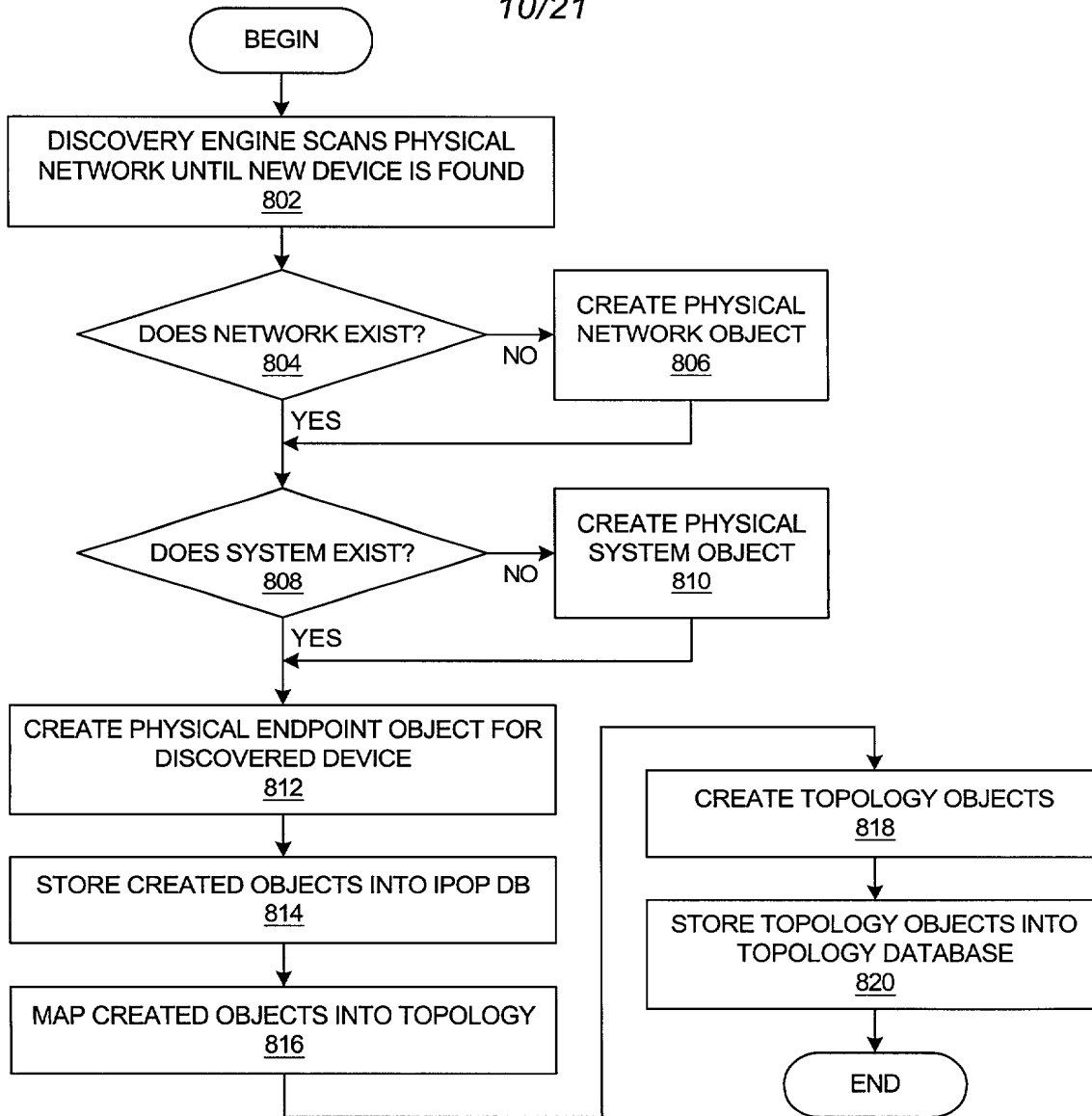


FIG. 8A

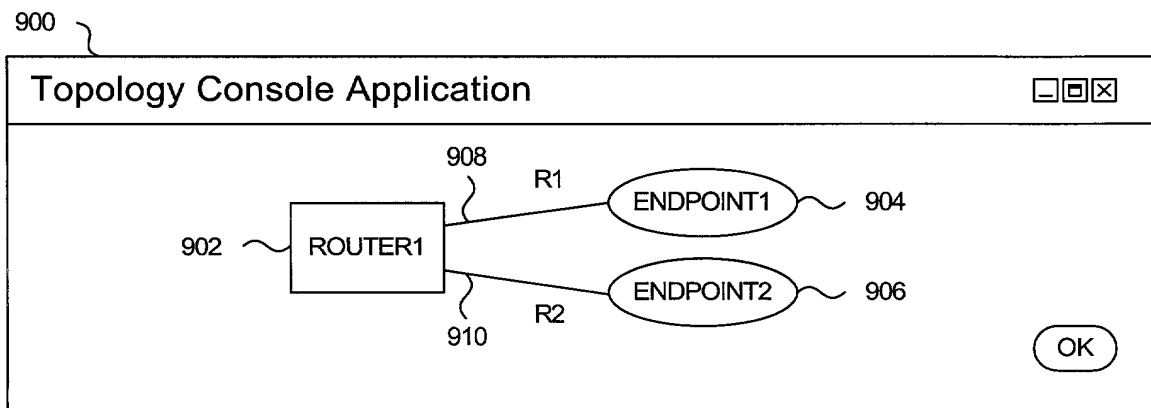
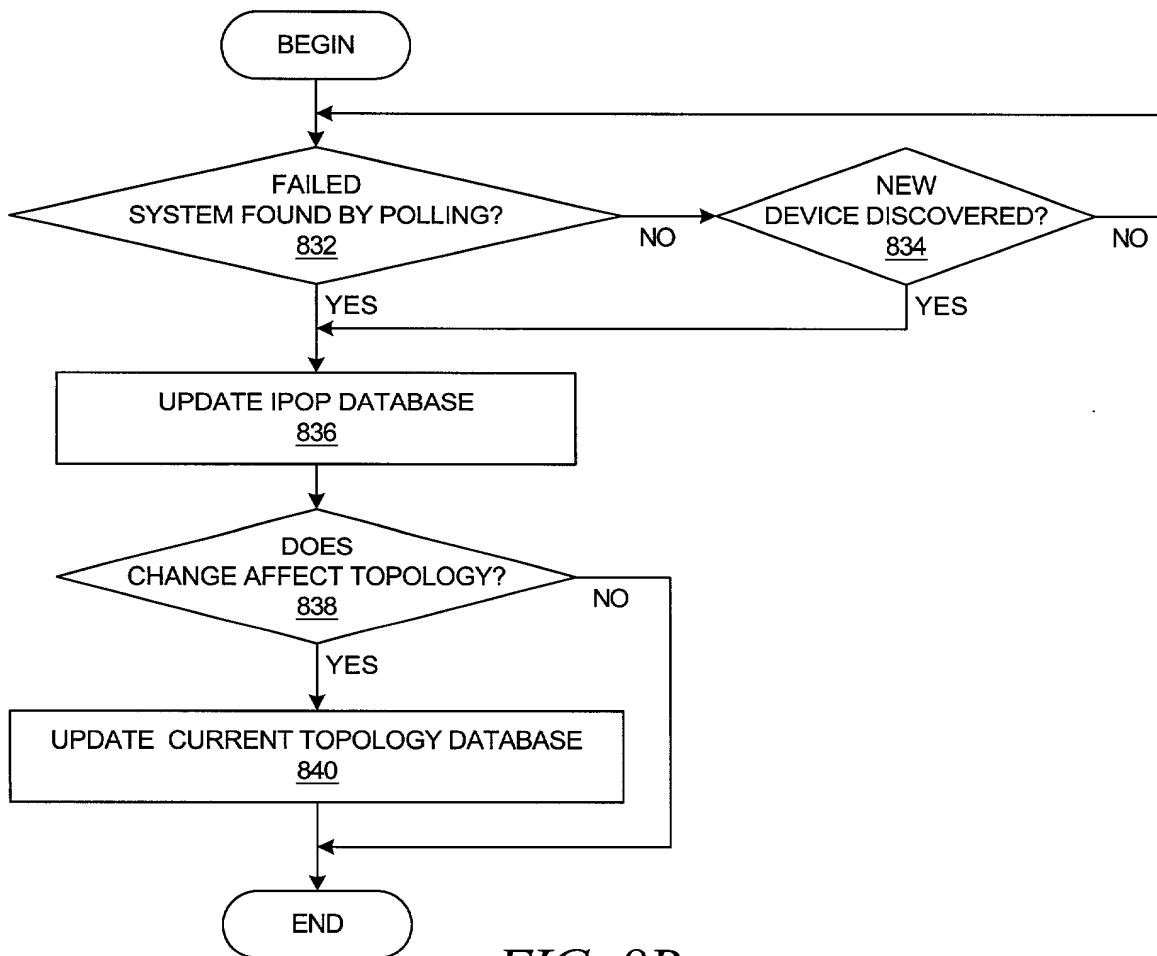
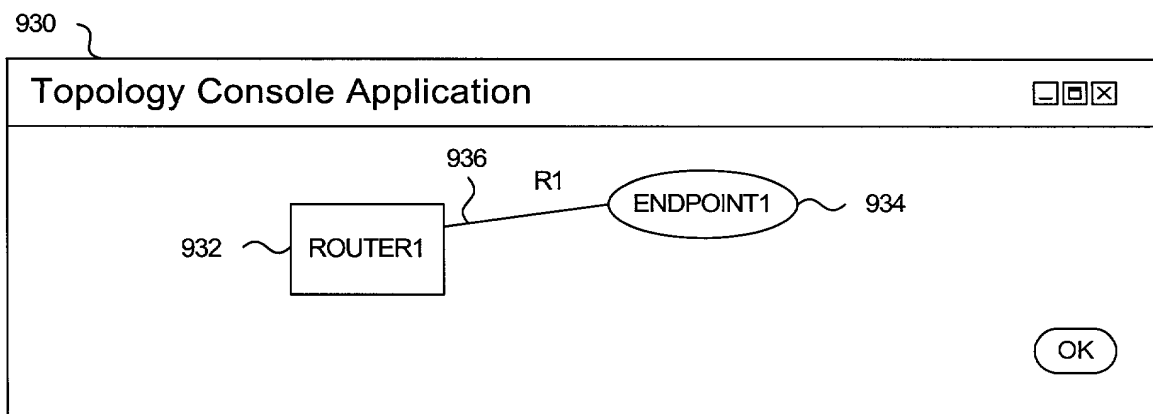


FIG. 9A

**Method and system for restricting and enhancing topology displays
for multi-customer logical networks within a network management system**

11/21

*FIG. 8B**FIG. 9B*

12/21

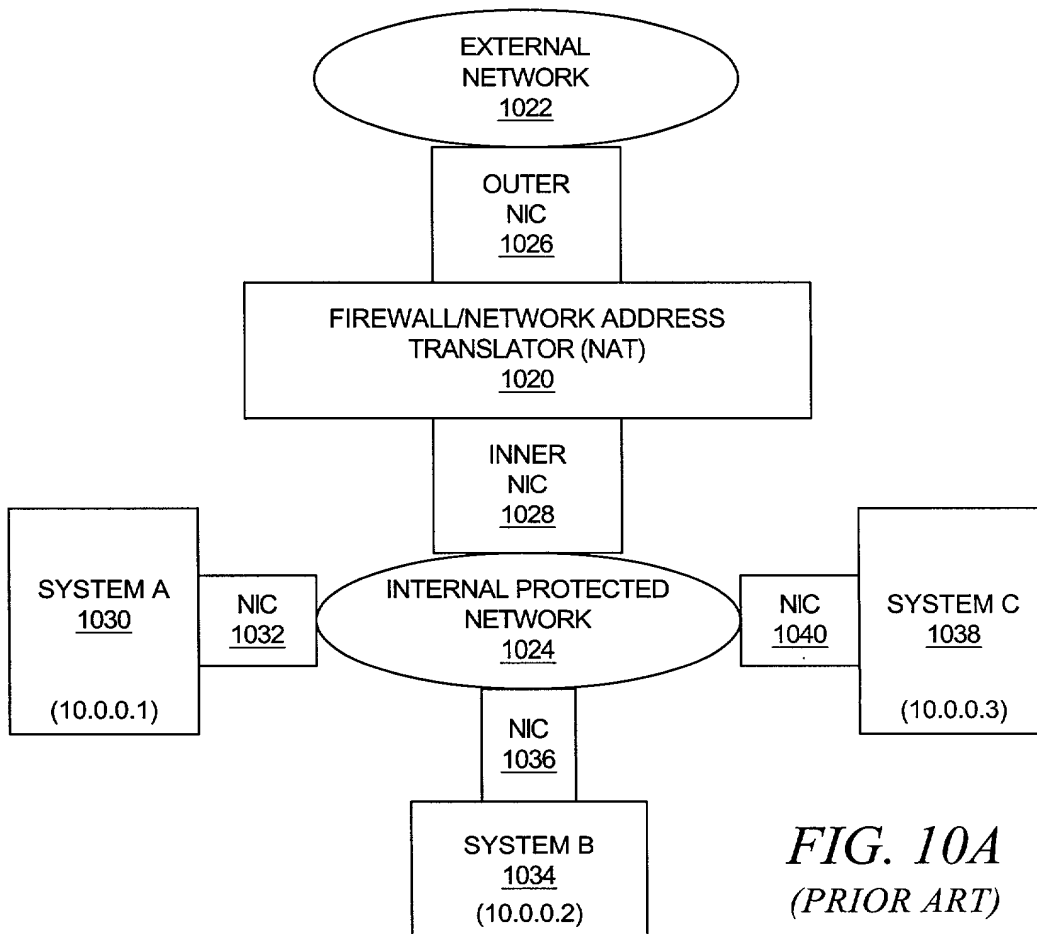


FIG. 10A
(PRIOR ART)

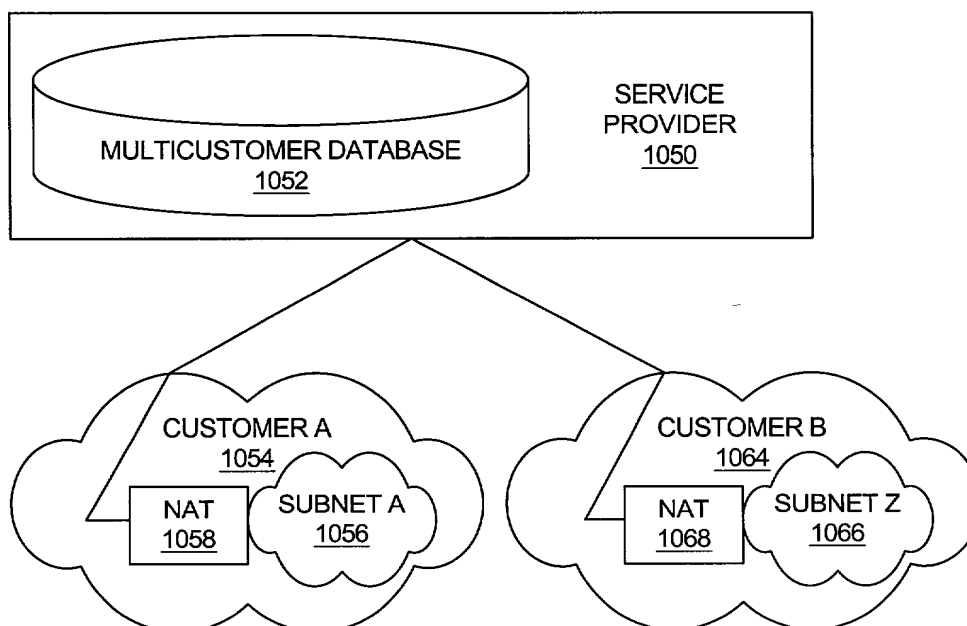


FIG. 10B

Method and system for restricting and enhancing topology displays
for multi-customer logical networks within a network management system

13/21

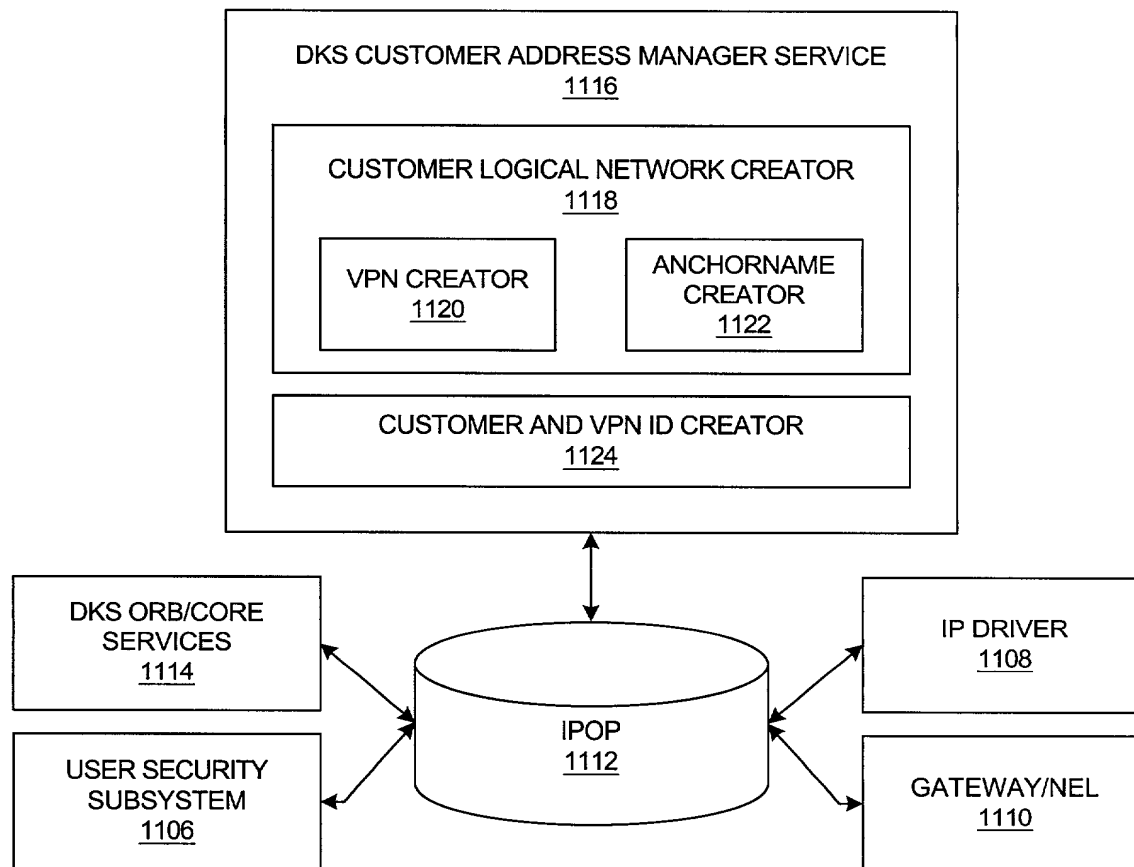


FIG. 11A

1350

Network Management Application [min] [max] [close]

NETWORKS REQUIRING VPN CREATION—DUPLICATE ADDRESSES EXIST

PHYSICAL NETWORK ADDRESS: 10.7.205.103 ~ 1352

CUSTOMER ANCHORNAME: AUSTINBLDG1 ~ 1356

VPN ID: ~ 1370

PHYSICAL NETWORK ADDRESS: 10.7.205.103 ~ 1354

CUSTOMER ANCHORNAME: AUSTINBLDG2 ~ 1358

VPN ID: ~ 1372

1378 ☒ CHANGE VPN ID FOR ENTIRE SCOPE

~ 1374 ~ 1376

FIG. 13

**Method and system for restricting and enhancing topology displays
for multi-customer logical networks within a network management system**

14/21

```

Public Class IPActionObject {

    Endpoint sourceEP;
    Endpoint targetEP;

    // CONSTRUCTOR
    IPActionObject( Endpoint targetEP, Endpoint sourceEP ) {
        .
        .
        .
    }
    VOID performAction( ) // EXECUTES ACTION METHOD
    .
    .
    .
}

```

FIG. 11B

```

Public Class Endpoint {

    // public variables
    long   EObjectID; // ID to object (both private and public network addresses)
    InetAddress EIPAddress; // physical network address (private or public)
    long   EPVPN; // virtual private network ID

    //get/set of variables
    public long      getObjectID( ) { ... }
    public InetAddress getPAddress( ) { ... }
    public long      getVPN( ) { ... }

}

```

FIG. 11C

```

Public Class EndpointCustomer extends Endpoint {

    public getVPNGW( ) {
        //gets the only gateway which has access to a particular private network
        .
        .
        .
    }
    //private variables only set/accessed by EP creator IPOP
    long   customerHashNumber;
    String customerName;
    String customerAnchorPath;
    Long   objectloFPrivateGatewayRoute

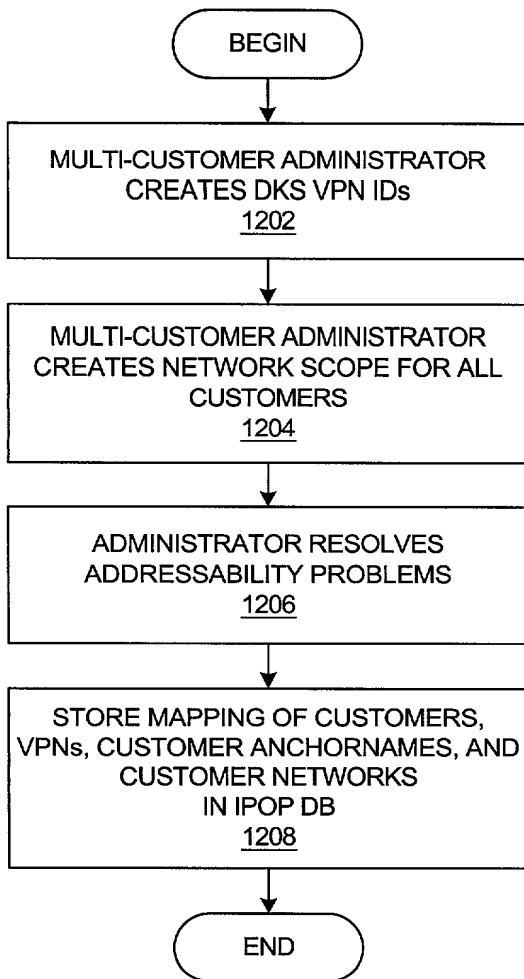
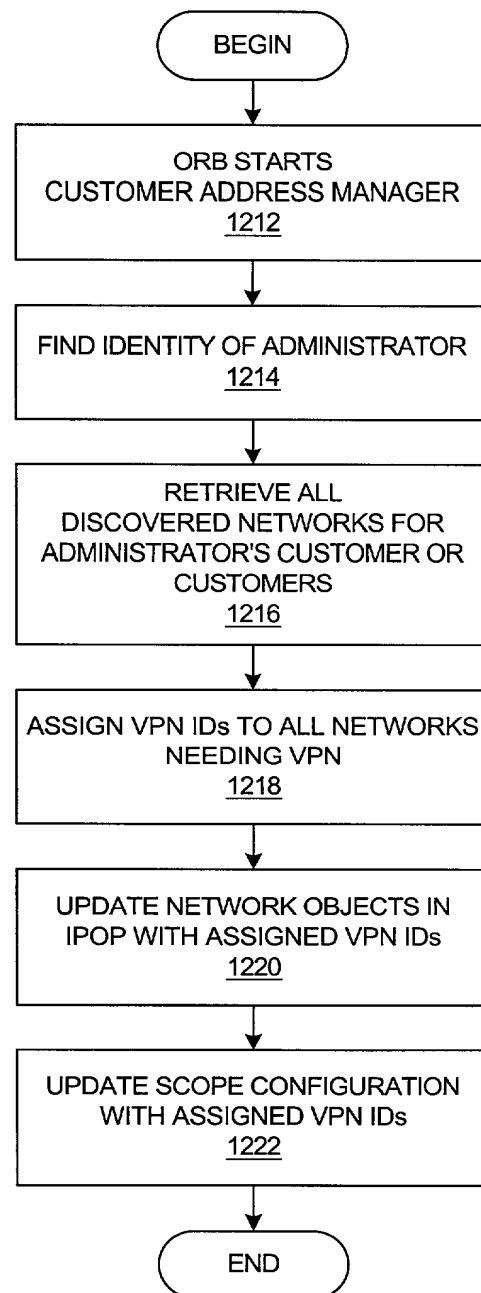
}

```

FIG. 11D

Method and system for restricting and enhancing topology displays
for multi-customer logical networks within a network management system

15/21

*FIG. 12A**FIG. 12B*

Method and system for restricting and enhancing topology displays
for multi-customer logical networks within a network management system

16/21

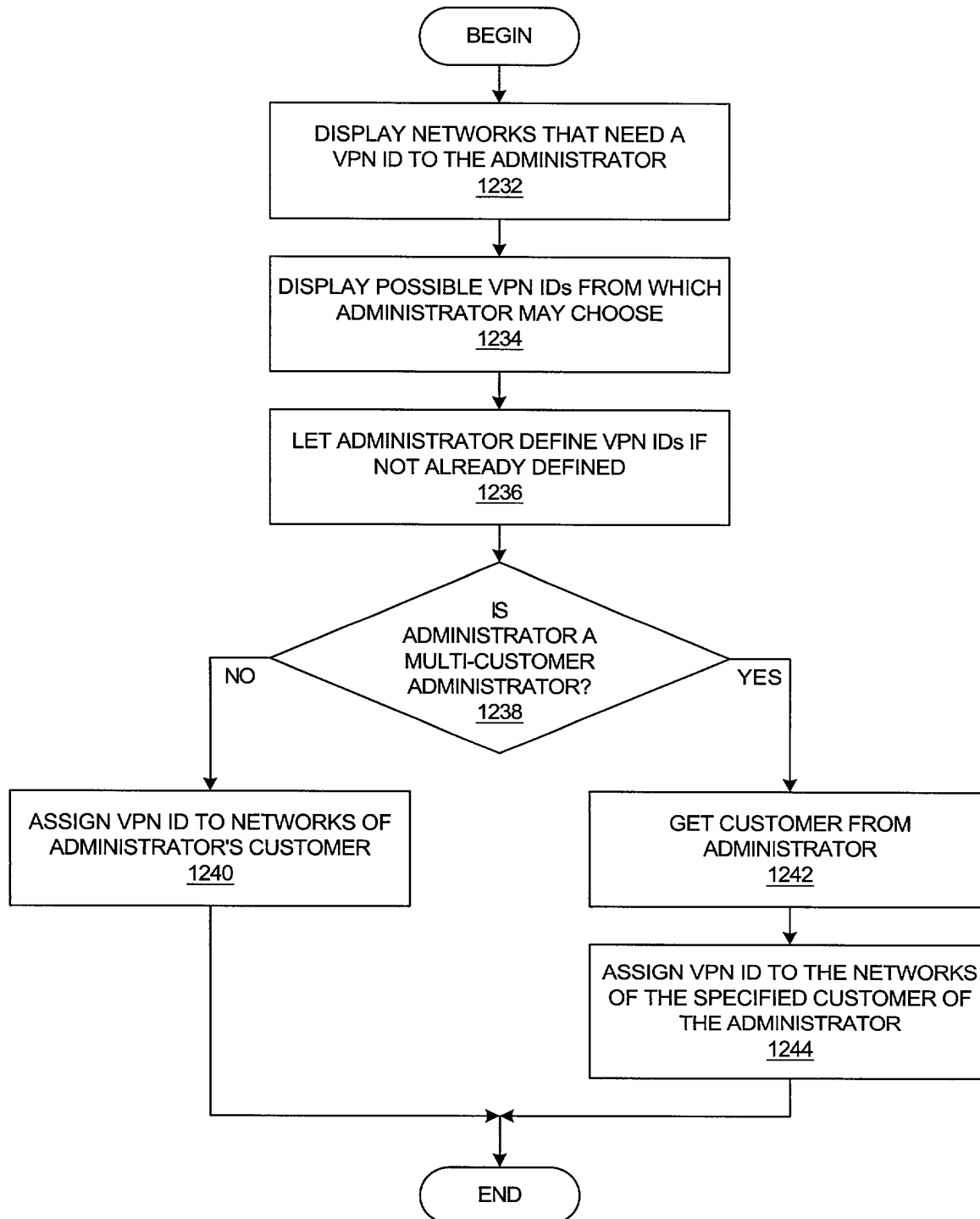


FIG. 12C

Method and system for restricting and enhancing topology displays
for multi-customer logical networks within a network management system

17/21

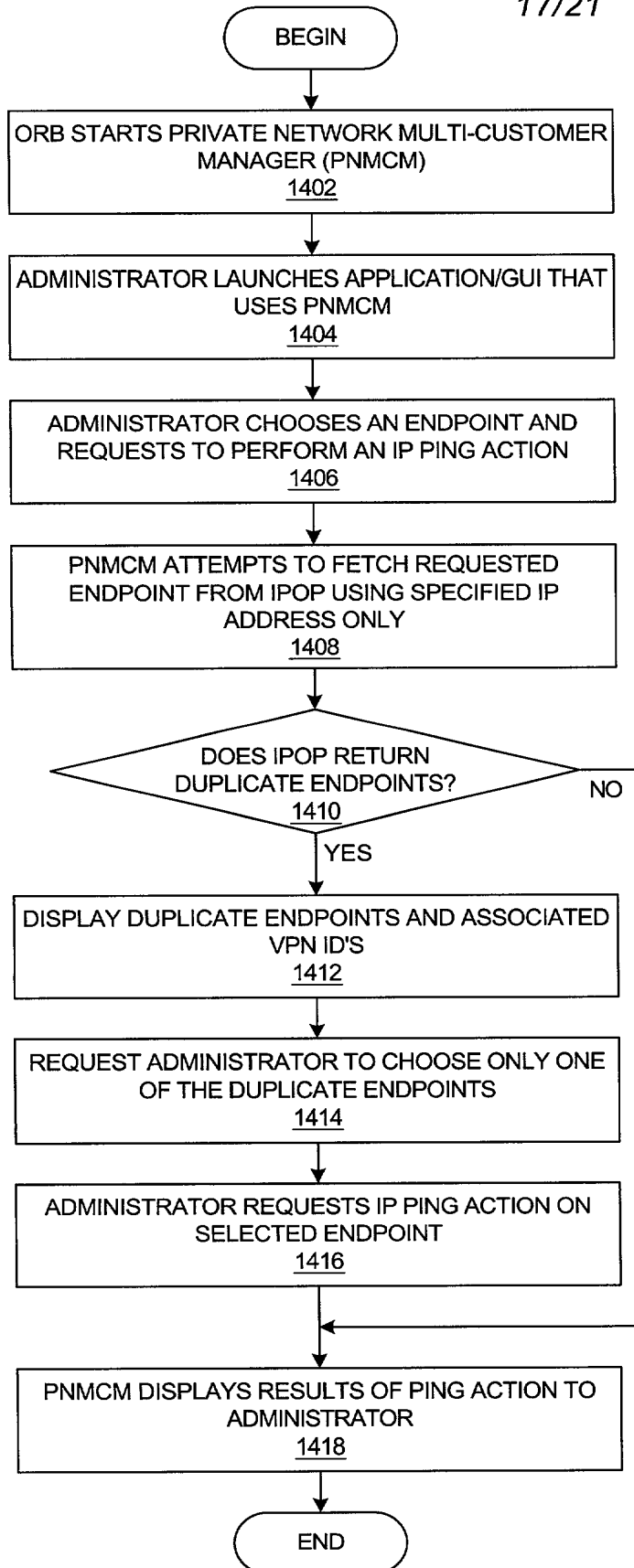


FIG. 14A

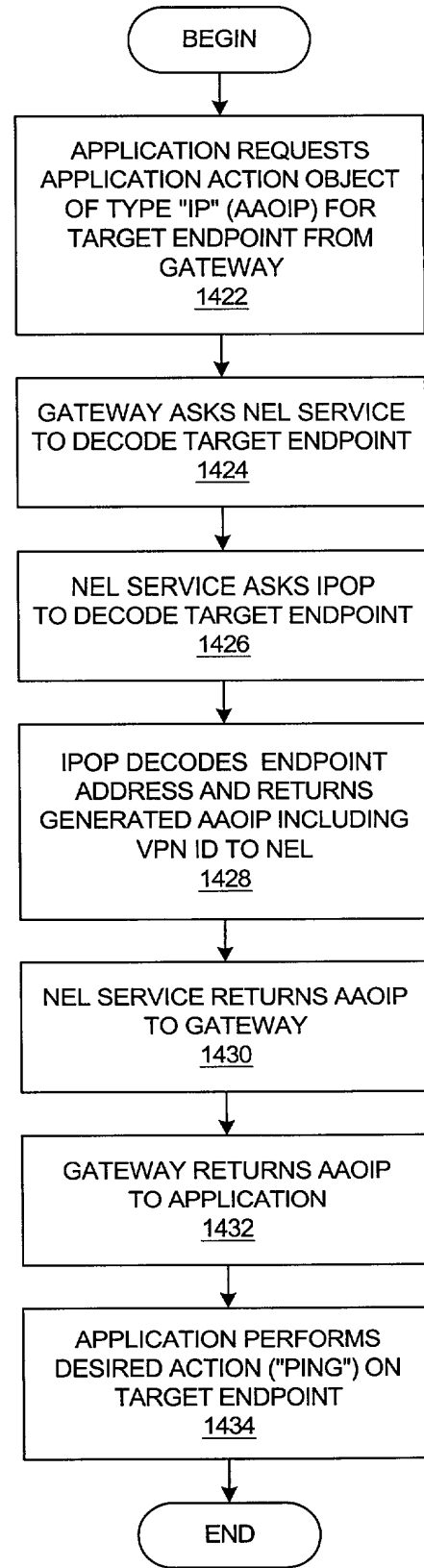


FIG. 14B

Method and system for restricting and enhancing topology displays
for multi-customer logical networks within a network management system

18/21

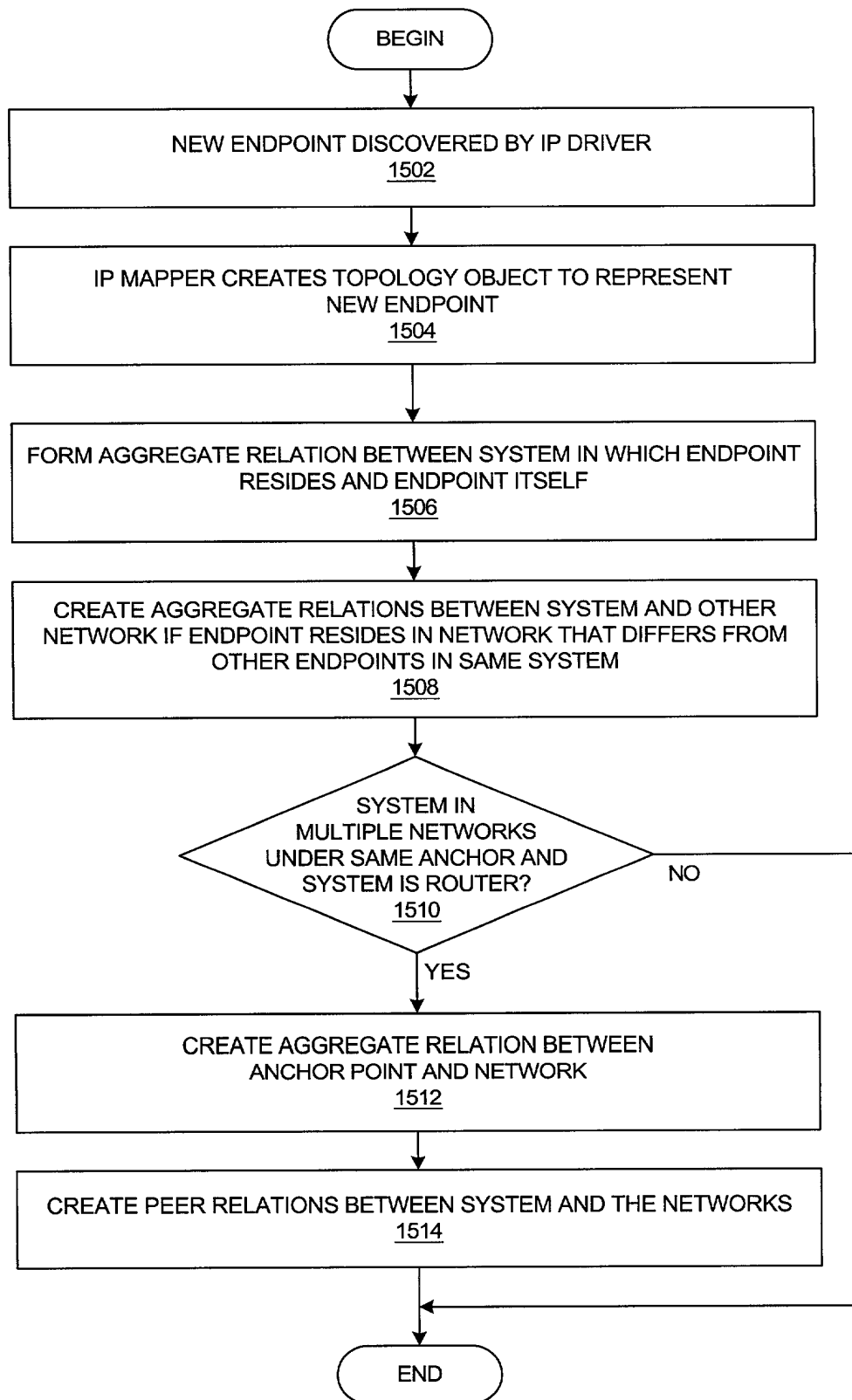
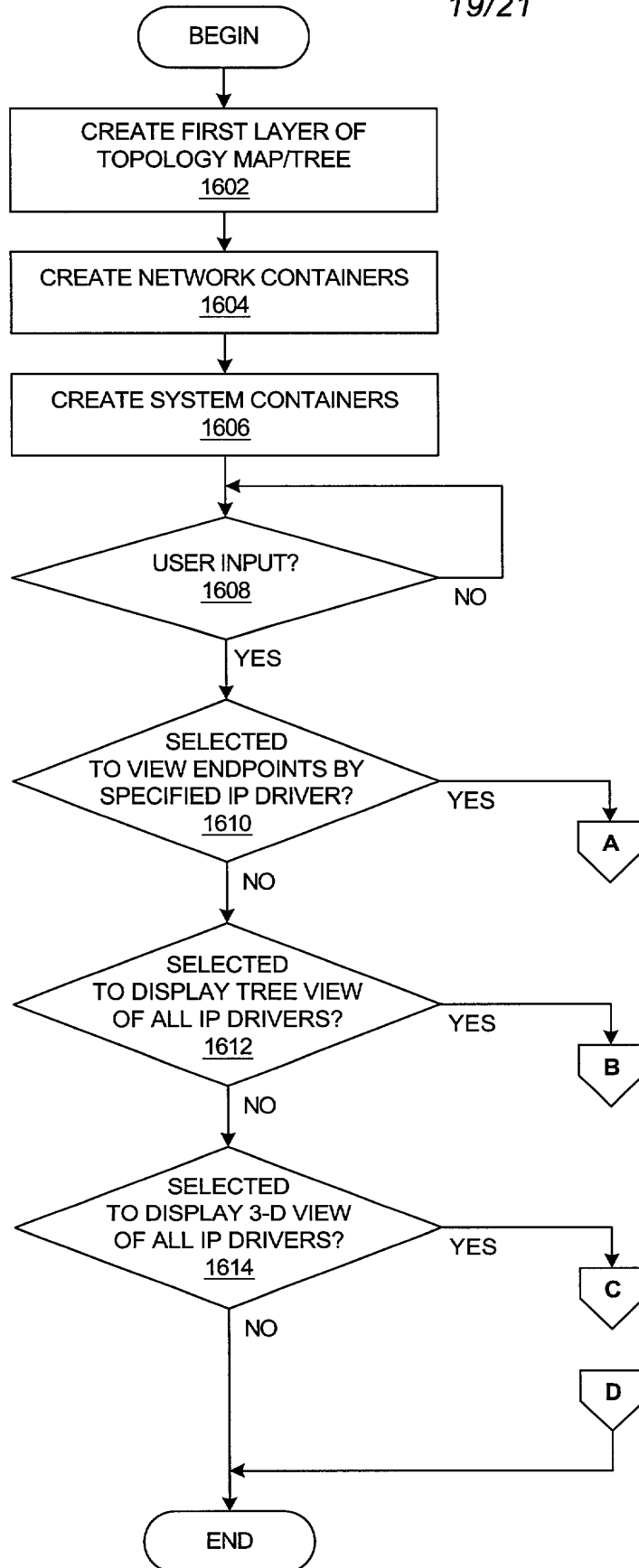


FIG. 15

**Method and system for restricting and enhancing topology displays
for multi-customer logical networks within a network management system**

19/21

*FIG. 16A*

Method and system for restricting and enhancing topology displays
for multi-customer logical networks within a network management system

20/21

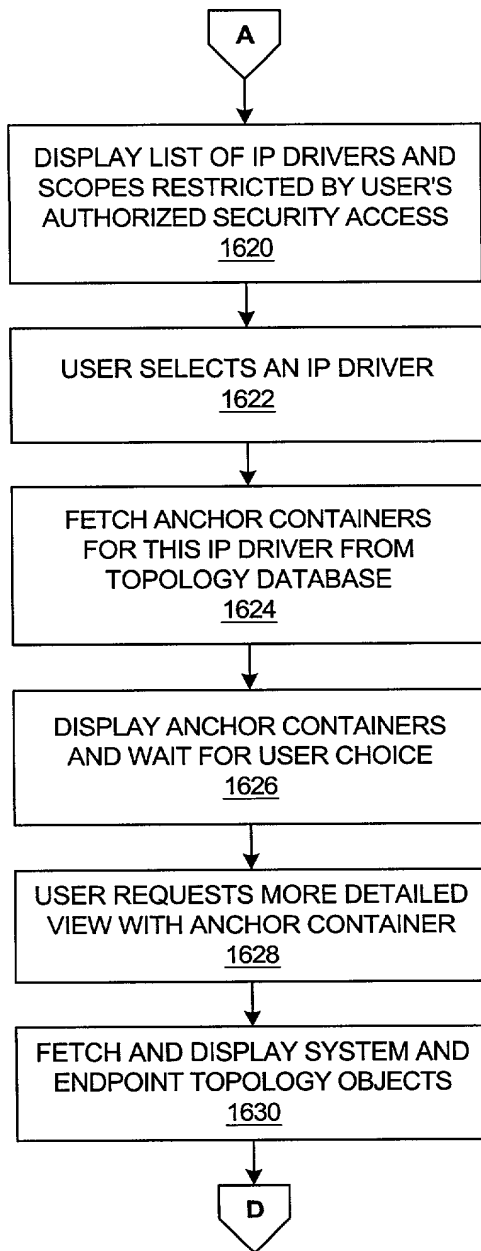


FIG. 16B

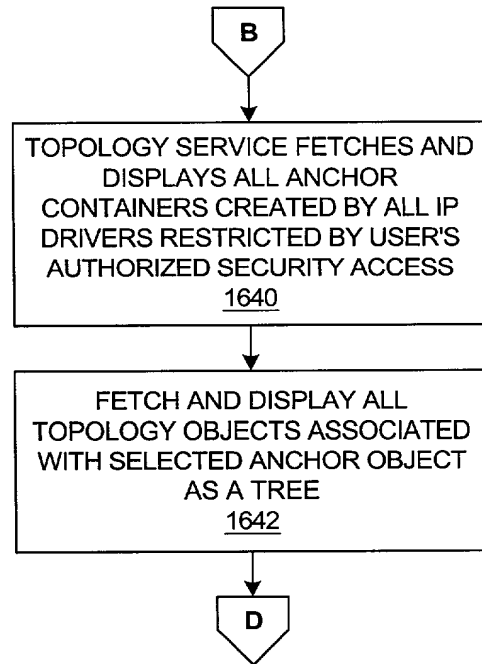


FIG. 16C

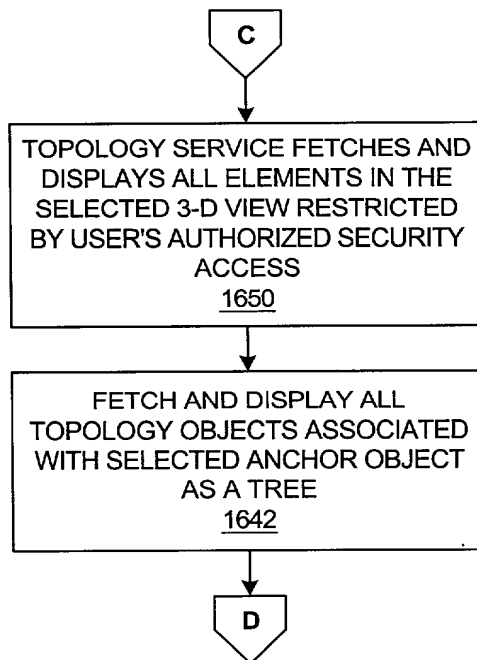


FIG. 16D

Method and system for restricting and enhancing topology displays
for multi-customer logical networks within a network management system

21/21

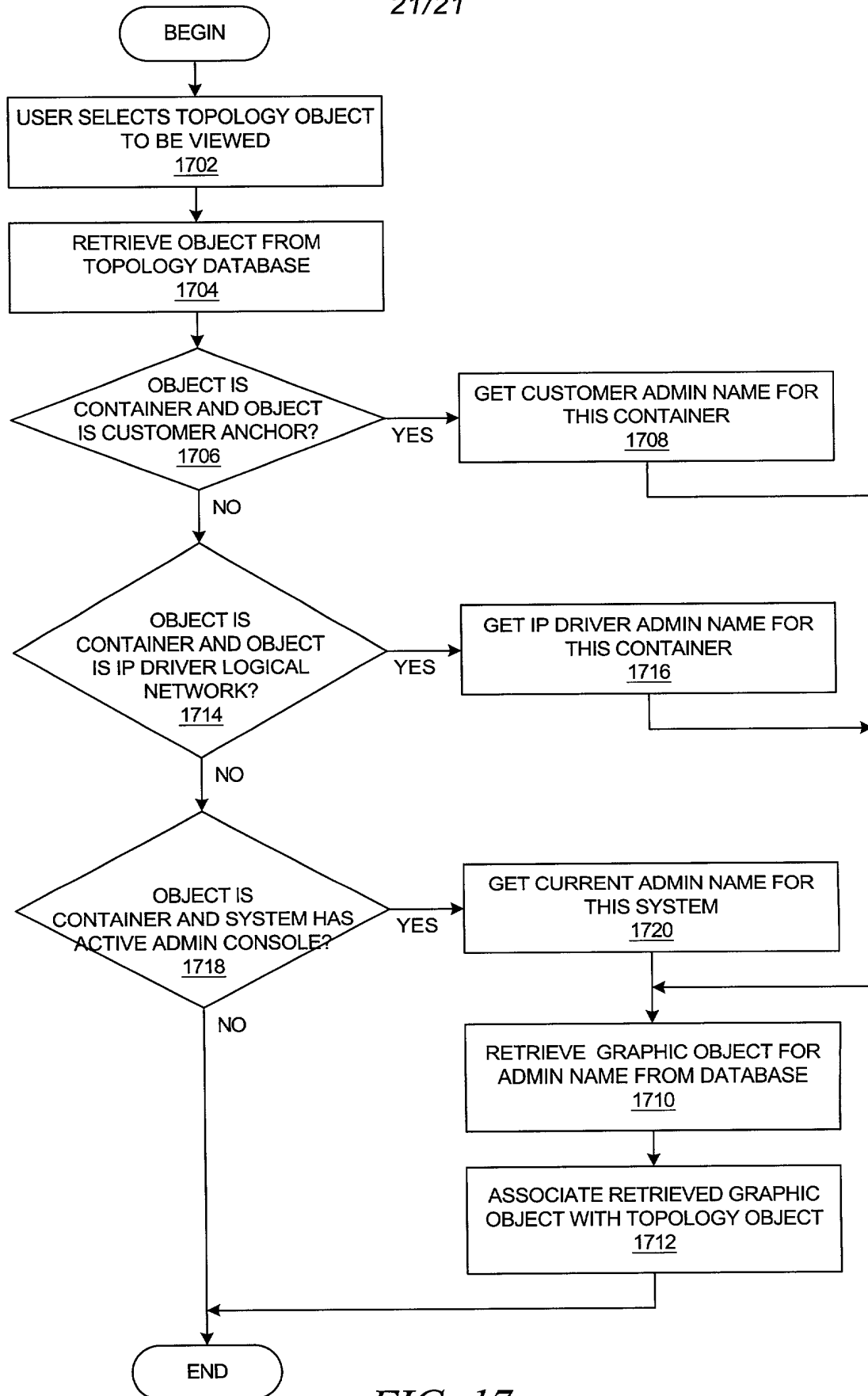


FIG. 17